RADIATION IMAGE READING CONDITION AND/OR IMAGE PROCESSING CONDITION DETERMINING METHOD

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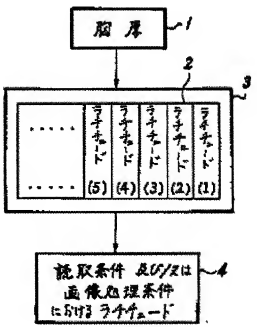
Abstract of **JP5003866**

PURPOSE:To obtain the radiation image suitable for progress observation and to allow the recognition of the progressing state and treating state of a lesion part by determining the latitude under always the same reading conditions and/or image processing conditions for the same patient in accordance with the information on the physique of the less changing patient. CONSTITUTION:A standard table 2 which stores the latitude 4 under the reading conditions and/or image processing conditions corresponding to the information on the patient's chest thickness, i.e., the information on the patient's physique which is the information having not so much changes even during the time when the progress observation of a series of the radiation images of the same patient is executed is prepd. The latitude 4 under the reading conditions at the time of reading the radiation images for the progress observation of the patient recorded on a recording sheet and/or the image processing conditions at the time of subjecting the read images to image processing is determined by referring to the standard table 2 by a condition determining means 3 in accordance with the information on the patient's physique inputted from an information input means 1. The reproduced images suitable for comparison with the past reproduced images are obtd. in this way.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]The read condition at the time of acquiring the picture signal with which this invention reads in photoelectricity the radiation image recorded on record sheets, such as an accumulative fluorescent body sheet and an X-ray film, and said radiation image is expressed, It is related with the radiation image read condition and/or image processing condition determination method which search for the image processing condition at the time of performing image processing to a picture signal.
[0002]
[Description of the Prior Art]After reading the radiation image this recorded on the record sheet by carrying out accumulation record of the radiation image, acquiring a picture signal and performing suitable image processing for this picture signal, carrying out reproduction record of the picture is performed in various fields. For example, an X-ray picture is recorded using an X-ray film with a low gamma value designed suit next image processing, By reading an X-ray picture in the film in which this X-ray picture was recorded, changing into an electrical signal, and reproducing as a visible image in a copy photograph etc., after performing image processing to this electrical signal (picture signal), Obtaining a reproduced image with good image quality performances, such as contrast, sharpness, and granulation, is performed (refer to JP,61-5193,B).
[0003]If it irradiates with radiation (X-rays, alpha rays, a beta ray, a gamma ray, an electron beam, ultraviolet rays, etc.), a part of this energy of radiation will be accumulated by the applicant for this patent, The accumulative phosphor (photostimulable phosphor) in which accelerated-phosphorescence luminescence is shown according to the energy accumulated when irradiated with excitation light, such as visible light, after that is used, The radiation image information on the photographic subject of a human body etc. is once recorded on a sheet shaped accumulative phosphor, Scan this accumulative fluorescent body sheet by excitation light, such as a laser beam, and accelerated-phosphorescence luminescent light is made to produce, Read the obtained accelerated-phosphorescence luminescent light in photoelectricity, acquire a picture signal, and the radiation image of a photographic subject based on this picture signal Recording materials, such as a photographic material, The radiation-image-recording reproducing system made to output to CRT etc. as a visible image is already proposed (JP,55-12429,A, 56-11395, and the 55-163472 an item and the 56-104645 an item, 55-116340, etc.).
[0004]This system has the practical advantage that a picture can be recorded over very large radiation exposure as compared with the radiograph system which uses the conventional film photo. Namely, it is accepted that the light volume of the luminescent light which carries out accelerated-phosphorescence luminescence by excitation after accumulation to a radioactive rays exposure is proportional over the very wide range in an accumulative phosphor, Therefore, even if it changes a radioactive rays exposure quite substantially according to various photographing conditions, Set a reading gain as a suitable value, read the light volume of the accelerated-phosphorescence luminescent light emitted from an accumulative fluorescent body sheet by a photoelectric conversion means, and it is changed into an electrical signal, The radiation image which is not influenced by change of a radioactive rays exposure can be obtained by making a radiation image output to displays, such as recording materials, such as a photographic material, and CRT, as a visible image using this electrical signal.
[0005]So that the reproduced image obtained eventually may turn into the best picture in the above-mentioned

system, Perform prediction to which a radiation image irradiates first with the optical beam of a low the accumulative fluorescent body sheet by which accumulation record was carried out, and a part of accelerated-phosphorescence luminescent light is made to emit, and a look-ahead picture signal is acquired, The intensity of the radiation irradiated by this sheet based on this look-ahead picture signal, The read condition in the case of this reading which gets to know a dynamic range etc., reads the radiation image by which accumulation record is carried out by irradiating with the optical beam of a high level from the optical beam used for the above-mentioned prediction at the account sheet of Gokami, and acquires a picture signal, Or there is a system constituted so that the image processing condition at the time of performing image processing to a picture signal after this reading reading might be determined automatically (for example, JP,58-67242,A). .

[0006]. With a read condition and an image processing condition, affect the sensitivity and gradation of a reproduced image here. It reads, respectively, various kinds of conditions in the case of image processing are named generically, and the power of a gain [in / reading], a scale factor, and an optical beam, etc. the scale conversion of the picture signal in image processing, etc. are meant.

[0007]The large/smallness of the energy of the optical beam irradiated per unit area of the above-mentioned sheet with a high level/low of an optical beam, respectively, Or when the energy of the accelerated-phosphorescence luminescent light emitted from the above-mentioned sheet is dependent on the wavelength of the above-mentioned optical beam (it has wavelength sensitivity distribution), As a method of saying the large/smallness of the weighting energy after carrying out weighting of the energy of the optical beam irradiated per unit area of the above-mentioned sheet by the above-mentioned wavelength sensitivity, and changing the level of an optical beam, How to change the intensity of the optical beam emitted from the method of using the optical beam of different wavelength, a laser light source, etc. itself, Publicly known various methods, such as a method of changing the intensity of an optical beam, a method of changing the beam diameter of an optical beam and changing scanline density, and a method of changing a scan speed, can be used by inserting and removing an ND filter etc. on the optical path of an optical beam.

[0008]The method of grasping beforehand the recorded state and recording pattern of radiation image information as mentioned above, and performing image processing according to the grasped information to a picture signal, An accumulative fluorescent body sheet in particular is not used, but when reading the radiation image photoed by the film photo film etc. which are known from the former and acquiring a picture signal, it can be applied similarly, and it is effective.

[0009]

[Problem(s) to be Solved by the Invention]Since the read condition or the image processing condition is determined that each reproduced image will serve as best in the above-mentioned system, it is ideal for observing only each reproduced image, but. For example, if reading of a picture differs from the conditions of image processing when comparing the picture photoed and saved in the past of the same photographic subject with the picture which photoed the present state and investigating the concentration change of both images, etc., the problem that it may become difficult to grasp the grade of a concentration change correctly will be produced.

[0010]The concrete example of this problem is explained with reference to drawing 4 - drawing 7.

[0011]Drawing 4 is a figure showing some (thorax transverse plane) radiation images 66 of the human body by which the repeat display was carried out to the photographic film 65. Although the normal portion 66b of this radiation image 66 shows the almost same concentration, with the portion of others [portion / 66a / sick], concentration is thin.

[0012]Drawing 5 is the graph which showed the grade of the abnormalities in concentration of the sick portion 66a when the radiation image of two or more sheets is photoed and reproduction record is temporally carried out about the photographic subject shown in drawing 4. The above-mentioned illness is going towards recovery temporally. The graph A shows the line of the ideal which should be essentially reproduced in this way from the progress of recovery with sick concentration of the sick portion 66a. However, when the above-mentioned reading and image processing are performed so that the reproduced image per sheet may become respectively the optimal, the abnormalities in concentration of the sick portion 66a in the picture reproduced eventually may become like the graph B by the disturbance factor of the concentration change of the sick portion 66a, or others. In this case, the grade of a lesion is judged by the difference of the concentration of the sick portion 66a, and the

concentration of the normal portion 66b. That is, from the picture photoed in time T_1, there is a possibility of judging the place which should be essentially judged to be density difference $deltaD_1$ (it becomes in density difference large: and unusual) like the graph A to be density difference $deltaD_1'$ (density-difference smallness: it recovered considerably) like the graph B. From the picture photoed in time T_2. The place which should be essentially judged to be density difference $deltaD_2$ ($deltaD_2<deltaD_1$), In [will judge it as density difference $deltaD_2'$ ($deltaD_2'>deltaD_1'$), and] time T_2, There is a possibility that the mistaken diagnosis as if illness had reached an advanced stage in spite of illness going towards recovery ($deltaD_2<delta_1D$) compared with time T_1' ($deltaD_2'>deltaD_1'$) may be made.

[0013]Drawing 6 is the figure by which the repeat display was carried out to photographic-film 65' and in which drawing 4 showed a part of (lumbar-vertebrae side) radiation image 66' of a different human body. When performing sick diagnosis which the concentration of bony partial 66a ' expressed to picture 66' becomes high, and appears, bony partial 66a ' and partial 66b' other than a bone, Since it is an organ which is mutually different unlike the case of drawing 4, the density difference of these two portions must not serve as an antecedent basis of judgment, but must be judged for concentration itself of bony partial 66a '.

[0014]However, conditions are set up reproduce a picture so that the concentration of bony partial 66a' may usually become fixed when obtaining such a reproduced image.

[0015]Drawing 7 is the graph which showed the grade of the abnormalities in concentration of bony partial 66a ' when the radiation image of two or more sheets is photoed and reproduction record is temporally carried out about the photographic subject shown in drawing 6. Illness is going towards recovery temporally like the case of drawing 5. Graph A' shows the line of the ideal which should be essentially reproduced in this way from the progress of recovery with sick concentration of bony partial 66a '. However, if said reading and image processing are performed so that partial 66a ' of the bone of the reproduced image per sheet may become the same concentration as mentioned above, Like graph B', except for a disturbance factor, the concentration of bony partial 66a ' is reproduced so that it may become the case of being normal, and the concentration same, in abbreviation, and there is a possibility that it may become impossible to judge the abnormalities in concentration of bony partial 66a ' in this case.

[0016]A way the radiation image for followup reproduced in the past determines a read condition and/or an image processing condition as a means to solve the above problems, in consideration of the accumulation recorded information on the sheet by which accumulation record was carried out (Japanese Patent Application No. No. 250881 [two to]), The method (Japanese Patent Application No. No. 161594 [two to]) of doubling a read condition and a photographing condition with the read condition of a radiation image and photographing condition which were acquired in the past about the same photographic subject is proposed by these people.

[0017]However, the method proposed by Japanese Patent Application No. No. 250881 [two to] and 2-161594 which were mentioned above, It becomes what has the big load to the software and hardware which constitute a described method since the mass memory storage which memorizes the read condition, image processing condition, and photographing condition about individual people of many photographic subjects is required, In order to realize a described method, the very large-scale device was required.

[0018]This invention is made in view of the above situations, and it aims at providing the radiation image read condition and/or image processing condition determination method which can obtain the reproduced image which fitted comparative observation with the past reproduced image by simple composition.

[0019]

[0020]

[0021]

[0022]

[Means for Solving the Problem]The 1st radiation image read condition and/or image processing condition determination method of this invention, In a radiation image read condition and/or an image processing condition determination method which search for an image processing condition at the time of performing image processing

to a read condition and/or said acquired picture signal at the time of acquiring a picture signal which reads in photoelectricity a radiation image of a photographic subject recorded on a record sheet, and with which said radiation image is expressed, A latitude on said read condition corresponding to at least two information, and/or said image processing condition among height of a patient who is said photographic subject, weight, age, sex, and chest depth, A standard table memorized said every at least two information is prepared, and said RACHICHIDO is determined with reference to said standard table based on said at least two information. [many]

[0023]The 2nd radiation image read condition and/or image processing condition determination method by this invention, In the 1st radiation image read condition and/or image processing condition determination method by this invention mentioned above, sensitivity on said read condition and/or an image processing condition is inputted from an external device.

[0024]The 3rd radiation image read condition and/or image processing condition determination method by this invention, In the 1st radiation image read condition and/or image processing condition determination method by this invention, The 1st picture signal that reads in photoelectricity a radiation image of a photographic subject recorded on said record sheet and with which said radiation image is expressed is acquired, Sensitivity on said read condition at the time of acquiring the 2nd picture signal showing said radiation image from said record sheet based on this 1st picture signal is determined.

[0025]A latitude corresponds to a light volume ratio of the mightiest accelerated-phosphorescence luminescent light to the weakest accelerated-phosphorescence luminescent light changed into a picture signal in the case of reading, and says here a rate of photoelectric conversion which defines of which level sensitivity makes a picture signal accelerated-phosphorescence luminescent light of predetermined light volume.

[0026]A dose of radiation recorded on a record sheet when photoing a radiation image is changed according to the physique of a patient who is a photographic subject, and when this patient's physique determines a read condition and an image processing condition, it has influence. Since size of chest depth is the optimal as a value showing a patient's physique, size of chest depth serves as an important element which determines a read condition and an image processing condition. Therefore, it is good to presume a patient's physique based on information on chest depth, and to determine a latitude on a read condition and/or an image processing condition.

[0027]In the 1st [by this invention], 2nd, and 3rd radiation image read conditions and/or image processing condition determination methods, Although he is trying to determine a latitude on a read condition and/or an image processing condition based on height, weight, age, sex, and at least two information in chest depth, This is because height, weight, age, and sex are suitable like chest depth mentioned above as a value showing the physique of a patient who is a photographic subject and these information serves as an important element which determines a latitude.

[0028]In a period which is performing a series of followup, the physique of a patient who is performing followup, i.e., chest depth, height, weight, etc. are not changed so sharply. Therefore, in this invention, information on the physique which was mentioned above as an element which determines a latitude on a read condition and/or an image processing condition of a radiation image is used, and it reads by the read condition always same about a series of radiation images of the same patient, and is made to perform the same image processing.

[0029]Chest depth expresses thickness of a breast here, and if chest depth becomes large, the girth of the chest will also become large. Therefore, suppose that chest depth and the girth of the chest are treated as an equivalent thing in this invention.

[0030]Although it is with information, including chest depth etc., and a corresponding latitude here, This expresses a latitude on a read condition and/or an image processing condition which can reproduce respectively optimal radiation image for every patients from whom the physique differs, such as a fat patient with large size of chest depth, and a thin patient with small size of chest depth.

[0031]

[Function]The radiation image read condition and/or image processing condition determination method by this invention, Information or height of chest depth of a patient which is the information which is not changed so sharply in the period which is performing followup, The standard table memorized for every information on the physique which mentioned above the latitude on the read condition and/or image processing condition corresponding to weight, age, sex, and at least two information in chest depth, i.e., the information on a patient's

physique, is prepared. [many]
Based on the information on the physique mentioned above, he determines a latitude with reference to this standard table, and is trying to determine the read condition and/or image processing condition of a radiation image in accordance with the sensitivity which was inputted by another method or was set up beforehand.
For this reason, by always reading a patient's radiation image by the same read condition, and performing the same image processing, a radiation image is obtained under the conditions always same about the same patient, and exact followup can be performed.
[0032]As information used by this invention, only a patient's chest depth Or chest depth, height, The amount of information called weight, age, and two information in sex is also the information acquired simply so mostly, If only the standard table which matches the latitude on these information and read conditions, and/or an image processing condition is memorized to the storage, in order to ask the patient of the same physique for the same conditions, It is not necessary to manage the information about patient individual people, and it becomes possible to determine a read condition and/or an image processing condition by the simple system which does not need so mass a storage.
[0033]
[Example]The example of this invention is described below.
[0034]Drawing 1 is a block diagram showing the underlying concept of this invention.
[0035]The underlying concept of this invention also in the period which is performing followup of a series of radiation images of same patient called the information on a patient's chest depth, i.e., the information on a patient's physique. The standard table 2 which memorized the latitude on so much changeless information, a corresponding read condition, and/or an image processing condition is prepared, Based on the information on a patient's physique that it was inputted by the information input means 1, by the condition determining means 3. The latitude on the image processing condition at the time of performing image processing to the read condition and/or the read picture at the time of reading this patient's radiation image for followup recorded on the record sheet with reference to the standard table 2 is determined. The information on this physique and a corresponding latitude express a latitude from which the physique differs and which can reproduce the respectively optimal radiation image for every patient, although the patient of various physiques, such as a fat patient with large size of chest depth and a thin patient with small size of chest depth, exists. That is, a large latitude is taken to a patient with large size of chest depth, and a latitude is narrowly taken to a patient with small size of chest depth. Since a radiation image is reproduced by the same conditions, it becomes unnecessary therefore, for the patient of the same physique to manage personal information in the computer system which includes this invention, and to use mass memory storage.
[0036]Drawing 2 shows the radiation image information reading reproducing system which reads radiation image information and is reproduced from the accumulative fluorescent body sheet which included the radiation image read condition by this invention, and/or the 1st example of the image processing condition determination method.
[0037]First, the memory card 51 is inserted in the card write reading device 50 connected with the computer system 40. This computer system 40, As the body part 41 in which CPU and the internal memory were built, and an auxiliary memory. It comprises CRT display 44 for displaying the keyboard 43 and the required information for inputting the directions etc. which the driving part 42 and operator which a ** floppy disk is inserted and are driven need for this computer system 40.
The standard table 2 which memorized many latitudes corresponding to the information on a patient's chest depth for every information on chest depth is memorized by the memory of this computer system 40.
The memory card 51 is prepared according to the patient (according to photographic subject name), and the information about a patient's chest depth is recorded.
[0038]Next, it is read by operating the keyboard 43 of the computer system 40, the information on a patient's chest depth, i.e., the size of chest depth, which were recorded on the memory card 51. The computer system 40 refers to the standard table 2 memorized by the memory based on the information on this chest depth, The latitude on the read condition at the time of reading an X-ray picture by the reading means 100 is called for, and the pressure value impressed to the photomultiplier 23 according to the sensitivity beforehand determined as this latitude, the amplification factor of the logarithmic amplifier 26, etc. are controlled. Here, since a patient's chest

depth is not what changes so much in the period which is performing a series of followup, this latitude becomes the same thing as the latitude at the time of reading the X-ray picture in a series of followup in this patient.
[0039]If a read condition is defined as mentioned above, reading of the accumulative fluorescent body sheet 11 in which accumulation record of a patient's X-ray picture was carried out in the X-rays equipment which is not illustrated will be performed.
[0040]The accumulative fluorescent body sheet 11 in which the X-ray picture was recorded is set to the prescribed position of the reading means 100. The accumulative fluorescent body sheet 11 set to this prescribed position is conveyed in the direction of arrow Y by the sheet conveying means 15 of the endless belt etc. which are driven by the motor which is not illustrated (vertical scanning). On the other hand, the reflective deviation of the optical beam 17 emitted from the laser light source 16 is carried out by the rotating polygon 18 which is driven by the motor 24 and carries out a high velocity revolution to an arrow direction, changing an optical path by the mirror 20 and entering into said accumulative fluorescent body sheet 11, after passing the focusing lenses 19, such as ftheta lens, -- the direction of vertical scanning (the direction of arrow Y) -- abbreviated -- horizontal scanning is carried out to a vertical arrow X direction. From the part where this optical beam 17 of the accumulative fluorescent body sheet 11 was irradiated, The accelerated-phosphorescence luminescent light 21 of light volume according to the radiation image information by which accumulation record is carried out is emitted, and this accelerated-phosphorescence luminescent light 21 is drawn with the lightguide 22, and is detected by the photomultiplier (photo-multiplier) 23 in photoelectricity. The above-mentioned lightguide 22 fabricates light guide nature materials, such as an acrylic board, and is made, It is allotted so that the incident end face 22a which makes linear shape may extend along the scanning line on the accumulative fluorescent body sheet 11, and the acceptance surface of the above-mentioned photomultiplier 23 is combined with the ejection end face 22b formed in a circle. The accelerated-phosphorescence luminescent light 21 which entered in the lightguide 22 from the above-mentioned incident end face 22a, Total internal reflection is repeated, it progresses, the inside of this lightguide 22 is ejected from the ejection end face 22b, light is received by the photomultiplier 23, and the light volume of the accelerated-phosphorescence luminescent light 23 showing a radiation image is changed into an electrical signal by the photomultiplier 23.
[0041]Analog output signal S outputted from the photomultiplier 23 is amplified in logarithm with the logarithmic amplifier 26, and is digitized with A/D converter 27, and picture signal S_Q is obtained. The signal level of this picture signal S_Q is proportional to the logarithm of the light volume of the accelerated-phosphorescence luminescent light emitted from each pixel of the accumulative fluorescent body sheet 11. Picture signal S_Q is obtained by the read condition defined by the computer system 40 as mentioned above.
[0042]Picture signal S_Q obtained by being digitized with A/D converter 27 is again inputted into the computer system 40. The same image processing condition as the time of acquiring a series of pictures for followup of the past in this patient based on the latitude obtained with reference to the standard table 2 based on the information on a patient's chest depth within the computer system 40 is defined, and suitable image processing for picture signal S_Q is performed, The picture signal with which this image processing was performed is sent to the reproduction means 29, and the repeat display of the X-ray picture based on the picture signal of a reproduction means 29 smell lever is carried out.
[0043]Although the sensitivity at the time of determining conditions used the value defined beforehand, it forms a means to input sensitivity and it may be made to input a predetermined value from the outside in the 1st example of the above. For example, the photographing device of the radiation image which is not illustrated is interlocked with, and sensitivity is set up with the dose of radiation with which the photographing device irradiated, and it may be made to input into the computer system 40, and may be made to input by manual operation.
[0044]Next, the 2nd example of this invention is described.
[0045]Drawing 3 shows the radiation image information reading reproducing system which reads radiation image information and is reproduced from the accumulative fluorescent body sheet which included the radiation image read condition by this invention, and/or the 2nd example of the image processing condition determination method. This system is a system which performs prediction mentioned above.

[0046]First, the memory card 51 is inserted in the card write reading device 50 connected with the computer system 40. This computer system 40, As the body part 41 in which CPU and the internal memory were built like the 1st example of this invention, and an auxiliary memory. It comprises CRT display 44 for displaying the keyboard 43 and the required information for inputting the directions etc. which the driving part 42 and operator which a ** floppy disk is inserted and are driven need for this computer system 40.
The standard table 2 which memorized many latitudes corresponding to the information on a patient's chest depth for every information on chest depth is memorized by the memory of this computer system 40.
The memory card 51 is prepared according to the patient (according to photographic subject name), and the information about a patient's chest depth is recorded.
[0047]Next, it is read by operating the keyboard 43 of the computer system 40, the information on a patient's chest depth, i.e., the size of chest depth, which were recorded on the memory card 51. The latitude of the read conditions at the time of the computer system 40 reading an X-ray picture like the 1st example of this invention with reference to the standard table 2 memorized by the memory based on the information on this chest depth is called for.
[0048]The accumulative fluorescent body sheet 11 in which the X-ray picture was recorded is set to the prescribed position of the look-ahead means 100 which predicts by making a part of energy of radiation which scanned with the taper beam first and was accumulated in this sheet 11 release. Since it is the same as that of the 1st example of this invention mentioned above about this look-ahead means 100 and the composition of this reader stage 100 ' mentioned later, detailed explanation is omitted.
[0049]The accumulative fluorescent body sheet 11 set to the prescribed position is read by the same method as the 1st example of this invention, is changed into an electrical signal, is amplified in logarithm with the logarithmic amplifier 26, and is digitized by piece **** 27 of A/D, and the look-ahead pixel signal Sp is acquired.
[0050]The acquired look-ahead picture signal Sp is inputted into the computer system 40. In the computer system 40, the sensitivity on a read condition and/or an image processing condition is determined based on the look-ahead picture signal Sp. The operation which asks for the sensitivity on this read condition and image processing condition can use the method (for example, JP,60-156055,A and the 60-185944 an item and the 61-280163 an item and the 63-233658) of using a publicly known histogram. [Refer to item gazette.]
[0051]The read condition, i.e., the sensitivity, and latitude in the case of this reading are called for as mentioned above, and the pressure value impressed, for example to the photomultiplier 23, the amplification factor of the logarithmic amplifier 26, etc. are controlled according to this sensitivity and a latitude.
[0052]Although accumulative fluorescent body sheet 11' which prediction ended is set to the prescribed position of this reader stage 100 ', sheet 11' is scanned by optical beam 17' stronger than the optical beam used for the above-mentioned prediction and a picture signal is acquired by the read condition defined as mentioned above, Since the composition of this reader stage 100 ' is the same in the 1st example the composition of the above-mentioned look-ahead means 100, and approximately same, i.e., this invention, and abbreviation, a dash is attached and shown in the number used for each component of the look-ahead means 100, and a corresponding component by the look-ahead means 100, and explanation is omitted.
[0053]Picture signal S_Q obtained by being digitized by A/D-converter 27' is again inputted into the computer system 40. The same image processing condition as the time of acquiring a series of pictures for followup of the past in this patient based on the latitude and sensitivity which were produced by making it above within the computer system 40 is defined, The picture signal with which suitable image processing for picture signal S_Q was performed, and this image processing was performed is sent to the reproduction means 29, and the repeat display of the X-ray picture based on the picture signal of a reproduction means 29 smell lever is carried out.
[0054]The memory card 51 which records the information about the patient for every patient in the 1st and 2nd examples of the above is prepared, Based on the information on the chest depth which is so much changeless also in the period of a series of followup, with reference to the standard table 2, the latitude on a read condition and/or an image processing condition was determined, and it reads by the same read condition as a series of followup, and was made to perform image processing by the same image processing condition. For this reason, a reproduced image suitable for carrying out comparative observation to a series of past pictures for followup can be obtained,

and advance, a treatment state, etc. of a patient's lesion part can be grasped.

[0055]Although he is trying to determine the latitude on a read condition and/or an image processing condition based on the information on a patient's chest depth in the 1st and 2nd examples of the above, It may be made to determine a latitude based on a patient's height, weight, age, sex, and at least two information in the information on chest depth. In this invention, as for it being required in the case of condition determination, since it is the information on a patient's physique, it is preferred that height and weight are included between at least two information in this case.

[0056]Although the memory card 51 is prepared for every patient and he is trying to read the information on a patient's chest depth with the card write reading device 50 in the 1st and 2nd examples of the above, Even if it does not use the memory card 51 and the card write reading device 50, of course, it may be made to input the information on a patient's chest depth from the keyboard 43 of the computer system 40.

[0057]Although the device which reads the radiation image recorded on the accumulative fluorescent body sheet in the above-mentioned example is explained, A device etc. which read the radiation image in which this invention was recorded on the conventional X-ray film besides such a device, The light showing the radiation image obtained from the record sheet in which the radiation image of the photographic subject was recorded can be read in photoelectricity, a picture signal can be acquired, and it can apply to the general radiation image reading playback equipment which carries out the reproducing output of the radiation image based on this picture signal.

[0058]

[Effect of the Invention]As explained to details above, based on the information on the physique of the patient who is so much changeless also in the period which is performing a series of followup, this invention, Since the latitude on the same read condition and/or image processing condition was always determined about the same patient, a radiation image suitable for followup is obtained and advance and the treatment state of a patient's lesion part can be grasped.

[0059]It is not necessary to manage a patient's personal information, and since it is not necessary to use mass memory storage, a simple system can determine a read condition and/or an image processing condition.

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CLAIMS

(57) [Claim(s)]

[Claim 1]In a radiation image read condition and/or an image processing condition determination method which search for an image processing condition at the time of performing image processing to a read condition and/or said acquired picture signal at the time of acquiring a picture signal which reads in photoelectricity a radiation image of a photographic subject recorded on a record sheet, and with which said radiation image is expressed, A latitude on said read condition corresponding to at least two information, and/or said image processing condition among height of a patient who is said photographic subject, weight, age, sex, and chest depth, A radiation image read condition and/or an image processing condition determination method preparing a standard table memorized said every at least two information, and determining said RACHICHIDO with reference to said standard table based on said at least two information. [many]

[Claim 2]The radiation image read condition according to claim 1 and/or an image processing condition determination method inputting sensitivity on said read condition and/or an image processing condition from an external device.

[Claim 3]The 1st picture signal that reads in photoelectricity a radiation image of a photographic subject recorded on said record sheet and with which said radiation image is expressed is acquired, The radiation image read condition according to claim 1 and/or an image processing condition determination method determining sensitivity on said read condition at the time of acquiring the 2nd picture signal showing said radiation image from said record sheet based on this 1st picture signal.

[Translation done.]

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(56)参考文献　特開　昭59－28144（ＪＰ，Ａ）
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特開　昭63－216544（ＪＰ，Ａ）

(54)【発明の名称】　放射線画像読取条件及び／又は画像処理条件決定方法

(57)【特許請求の範囲】

【請求項１】　記録シートに記録された被写体の放射線画像を光電的に読み取って前記放射線画像を表わす画像信号を得る際の読取条件及び／又は得られた前記画像信号に画像処理を施す際の画像処理条件を求める放射線画

おける感度を外部装置より入力することを特徴とする請求項１記載の放射線画像読取条件及び／又は画像処理条件決定方法。

【請求項３】　前記記録シートに記録された被写体の放射線画像を光電的に読み取って前記放射線画像を表わす

得る際の読取条件，画像信号に画像処理を施す際の画像処理条件を求める放射線画像読取条件及び／又は画像処理条件決定方法に関するものである。

【０００２】

【従来の技術】記録シートに放射線画像を蓄積記録し，該記録された放射線画像を読み取って画像信号を得，この画像信号に適切な画像処理を施した後，画像を再生記録することは種々の分野で行なわれている。たとえば，後の画像処理に適合するように設計されたガンマ値の低いＸ線フイルムを用いてＸ線画像を記録し，このＸ線画像が記録されたフイルムからＸ線画像を読み取って電気信号に変換し，この電気信号（画像信号）に画像処理を施した後コピー写真等に可視像として再生することにより，コントラスト，シャープネス，粒状性等の画質性能の良好な再生画像を得ることが行なわれている（特公昭61-5193 号公報参照）。

【０００３】また本願出願人により，放射線（Ｘ線，α線，β線，γ線，電子線，紫外線等）を照射するとこの放射線エネルギーの一部が蓄積され，その後可視光等の励起光を照射すると蓄積されたエネルギーに応じて輝尽発光を示す蓄積性蛍光体（輝尽性蛍光体）を利用して，人体等の被写体の放射線画像情報を一旦シート状の蓄積性蛍光体に記録し，この蓄積性蛍光体シートをレーザー光等の励起光で走査して輝尽発光光を生ぜしめ，得られた輝尽発光光を光電的に読み取って画像信号を得，この画像信号に基づき被写体の放射線画像を写真感光材料等の記録材料，ＣＲＴ等に可視像として出力させる放射線画像記録再生システムがすでに提案されている（特開昭55-12429号，同55-11395号，同55-163472 号，同56-104645 号，同55-116340号等）。

【０００４】このシステムは，従来の銀塩写真を用いる放射線写真システムと比較して極めて広い放射線露出域にわたって画像を記録しうるという実用的な利点を有している。すなわち，蓄積性蛍光体においては，放射線露光量に対して蓄積後に励起によって輝尽発光する発光光の光量が極めて広い範囲にわたって比例することが認められており，従って種々の撮影条件により放射線露光量がかなり大幅に変動しても，蓄積性蛍光体シートより放射される輝尽発光光の光量を読取ゲインを適当な値に設定して光電変換手段により読み取って電気信号に変換

ンジ等を知り，その後上記シートに上記先読みに用いた光ビームより高レベルの光ビームを照射して蓄積記録されている放射線画像を読み取って画像信号を得る本読みの際の読取条件，もしくは本読み読取後において画像信号に画像処理を施す際の画像処理条件を自動的に決定するように構成されたシステムがある（たとえば，特開昭58-67242）。

【０００６】ここで，読取条件，画像処理条件とは，再生画像の感度および階調に影響を及ぼす，それぞれ読取り，画像処理の際の各種の条件を総称するものであり，たとえば読取りにおけるゲイン，スケールファクタ，光ビームのパワー等や画像処理における画像信号のスケール変換等を意味するものである。

【０００７】また，光ビームの高レベル／低レベルとは，それぞれ，上記シートの単位面積当りに照射される光ビームのエネルギーの大／小，もしくは上記シートから発せられる輝尽発光光のエネルギーが上記光ビームの波長に依存する（波長感度分布を有する）場合は，上記シートの単位面積当りに照射される光ビームのエネルギーを上記波長感度で重みづけした後の重みづけエネルギーの大／小をいい，光ビームのレベルを変える方法としては，異なる波長の光ビームを用いる方法，レーザ光源等から発せられる光ビームの強度そのものを変える方法，光ビームの光路上にＮＤフィルター等を挿入，除去することにより光ビームの強度を変える方法，光ビームのビーム径を変えて走査密度を変える方法，走査速度を変える方法等，公知の種々の方法を用いることができる。

【０００８】また，上述のように放射線画像情報の記録状態および記録パターンを予め把握し，その把握した情報に応じた画像処理を画像信号に施す方法は，特に蓄積性蛍光体シートは用いず，従来から知られている銀塩写真フイルム等に撮影された放射線画像を読み取って画像信号を得る場合にも同様に適用可能で，かつ有効である。

【０００９】

【発明が解決しようとする課題】上記のシステムにおいては，個々の再生画像が最良となるように読取条件または画像処理条件が決定されているため，個々の再生画像のみを観察するには最適ではあるが，たとえば同一被写

度を示しているが病気の部分66a だけ他の部分とは濃度が薄くなっている。

【００１２】図5は、図４に示す被写体について，経時的に複数枚の放射線画像を撮影、再生記録したときの病気の部分66a の濃度異常の程度を示したグラフである。経時的に上記病気は治癒の方向に向かっている。グラフAは，病気の部分66a の濃度が、病気の治癒の進度から本来このように再生されるべき理想の線を示している。ところが、一枚ずつの再生画像がそれぞれ最適となるように上記読取りおよび画像処理を行なうと、病気の部分66a の濃度変化やその他の外乱的な要因により，最終的に再生された画像における病気の部分66a の濃度異常がグラフBのようになることがある。この場合に病変の程度は病気の部分66a の濃度と正常な部分66b の濃度の差により判断される。すなわち、時刻T_1 において撮影した画像からは，グラフAのように本来濃度差ΔD_1（濃度差大：かなり異常）と判断すべきところを、グラフBのように濃度差$\Delta D_1'$（濃度差小：かなり治癒された）と判断する恐れがある。また時刻T_2 において撮影した画像からは，本来濃度差ΔD_2（$\Delta D_2 < \Delta D_1$）と判断すべきところを、濃度差$\Delta D_2'$（$\Delta D_2' > \Delta D_1'$）と判断することとなり、時刻$T_2$ においては、時刻T_1' と比べ病気が治癒の方向に向かっている（$\Delta D_2 < \Delta_1 D$）にもかかわらず，病気が進行している（$\Delta D_2' > \Delta D_1'$）かのような誤った診断がなされる恐れがある。

【００１３】図6は、写真フイルム65′ に再生表示された，図４とは異なる人体の一部（腰椎側面）の放射線画像66′ を示した図である。画像66′ に表わされた骨の部分66a ′ の濃度が高くなってあらわれる病気の診断を行なう場合において、骨の部分66a ′ と骨以外の部分66b′ とは，図４の場合と異なり，互いに異なる器官であるため、この２つの部分の濃度差は判断の根拠とならず，骨の部分66a ′ の濃度自身で判断しなければならない。

【００１４】ところがこのような再生画像を得る場合、通常，骨の部分66a′ の濃度が一定となるように画像を再生するように条件が設定される。

【００１５】図7は、図６に示す被写体について，経時的に複数枚の放射線画像を撮影，再生記録したときの，

能となる恐れがある。

【００１６】上記のような問題を解決する手段として、過去に再生された経過観察用放射線画像が蓄積記録されたシートの蓄積記録情報を考慮して読取条件及び／又は画像処理条件を決定する方法（特願平2-250881号）、読取条件および撮影条件とを同一の被写体について過去に得られた放射線画像の読取条件および撮影条件と合わせるようにする方法（特願平2-161594号）が本出願人により提案されている。

【００１７】ところが上述した特願平2-250881号および同2-161594号に提案されている方法は，多数の被写体の個人々についての読取条件，画像処理条件および撮影条件を記憶しておく大容量の記憶装置が必要であるため上記方法を構成するソフトウェアおよびハードウェアへの負荷が大きなものとなり，上記方法を実現するためには非常に大がかりな装置が必要であった。

【００１８】本発明は上記のような事情に鑑みてなされたものであり，簡易な構成により過去の再生画像との比較観察に適した再生画像を得ることができる放射線画像読取条件及び／又は画像処理条件決定方法を提供することを目的とするものである。

【００１９】

【０００２０】

【０００２１】

【０００２２】

【課題を解決するための手段】本発明の第１の放射線画像読取条件及び／又は画像処理条件決定方法は，記録シートに記録された被写体の放射線画像を光電的に読み取って前記放射線画像を表わす画像信号を得る際の読取条件及び／又は得られた前記画像信号に画像処理を施す際の画像処理条件を求める放射線画像読取条件及び／又は画像処理条件決定方法において、前記被写体である患者の身長、体重，年令、性別および胸厚のうち少なくとも２つの情報に対応する前記読取条件及び／又は前記画像処理条件におけるラチチュードを、前記少なくとも２つの情報毎に多数記憶した標準テーブルを用意し，前記少なくとも２つの情報に基づいて前記標準テーブルを参照して前記ラチチードを決定することを特徴とするものである。

【０００２３】さらに，本発明による第２の放射線画像読

第１の画像信号を得、該第１の画像信号に基づいて、前記記録シートから前記放射線画像を表わす第２の画像信号を得る際の前記読取条件における感度を決定することを特徴とするものである。

【００２５】ここでラチチュードとは、読取りの際に画像信号に変換される最も微弱な輝尽発光光に対する最も強大な輝尽発光光の光量比に対応するものであり、感度とは所定の光量の輝尽発光光をどのレベルの画像信号とするかを定める光電変換率をいう。

【００２６】放射線画像を撮影する際に記録シートに記録される放射線量は、被写体である患者の体格によって変動するものであり、この患者の体格は、読取条件や画像処理条件を決定する際に影響を及ぼすものである。患者の体格を表わす値としては胸厚のサイズが最適であるため胸厚のサイズは読取条件や画像処理条件を決定する重要な要素となっている。したがって、胸厚の情報に基づいて患者の体格を推定し読取条件及び／又は画像処理条件におけるラチチュードを決定するのがよい。

【００２７】また、本発明による第１、第２および第３の放射線画像読取条件及び／又は画像処理条件決定方法において、身長、体重、年令、性別および胸厚のうちの少なくとも２つの情報に基づいて読取条件及び／又は画像処理条件におけるラチチュードを決定するようにしているが、これは上述した胸厚と同様に、身長、体重、年令、性別が被写体である患者の体格を表わす値として適しており、これらの情報がラチチュードを決定する重要な要素となっているからである。

【００２８】また、一連の経過観察を行っている期間において、経過観察を行っている患者の体格、すなわち、胸厚、身長、体重等はそれほど大きく変動するものではない。したがって、本発明においては、放射線画像の読取条件及び／又は画像処理条件におけるラチチュードを決定する要素として前述したような体格の情報を用いており、同一患者の一連の放射線画像については常に同じ読取条件で読み取り、同じ画像処理を施すようにしている。

【００２９】また、ここで胸厚とは胸の厚さを表わすものであり、胸厚が大きくなれば胸囲も大きくなる。したがって本発明においては胸厚と胸囲とを同等なものとして扱うこととする。

報あるいは身長、体重、年令、性別および胸厚のうちの少なくとも２つの情報、すなわち患者の体格の情報に対応する読取条件及び／又は画像処理条件におけるラチチュードを、前述した体格の情報毎に多数記憶した標準テーブルを用意しており、前述した体格の情報に基づいてこの標準テーブルを参照してラチチュードを決定し、別な方法によって入力されたあるいは予め設定された感度とあわせて放射線画像の読取条件及び／又は画像処理条件を決定するようにしている。このため常に同一の読取条件で患者の放射線画像を読み取り、かつ同一の画像処理を施すことによって、同一患者については常に同じ条件の下で放射線画像が得られ、正確な経過観察を行うことができる。

【００３２】また、本発明で用いる情報としては患者の胸厚のみあるいは胸厚、身長、体重、年令、性別のうちの２つの情報という情報量もそれほど多くなく簡単に得られる情報であり、また、これらの情報と読取条件及び／又は画像処理条件におけるラチチュードを対応づける標準テーブルのみを記憶媒体に記憶しておけば、同じような体格の患者に対しては同一の条件を求めるようになるため、患者個人々についての情報を管理する必要はなく、それほど大容量の記憶媒体を必要としない簡易なシステムによって読取条件及び／又は画像処理条件を決定することが可能となる。

【００３３】

【実施例】以下本発明の実施例について説明する。

【００３４】図１は本発明の基本的概念を示すブロック図である。

【００３５】本発明の基本的概念は、患者の胸厚の情報、すなわち患者の体格の情報という同一患者の一連の放射線画像の経過観察を行っている期間にも、それほど変化の無い情報と対応する読取条件及び／又は画像処理条件におけるラチチュードを記憶した標準テーブル２を用意し、情報入力手段１により入力された患者の体格の情報に基づいて条件決定手段３により標準テーブル２を参照して記録シートに記録されたこの患者の経過観察用放射線画像を読み取る際の読取条件及び／又は読み取った画像に画像処理を施す際の画像処理条件におけるラチチュードを決定するものである。また、この体格の情報と対応するラチチュードというのは、胸厚のサイズの大

る。

【００３６】図２は本発明による放射線画像読取条件及び／又は画像処理条件決定方法の第１実施例を内包した蓄積性蛍光体シートから放射線画像情報を読み取り再生する放射線画像情報読取再生システムを示すものである。

【００３７】先ず、コンピュータシステム40と接続されたカード記録読取装置50にメモリカード51が挿入される。このコンピュータシステム40は、ＣＰＵおよび内部メモリが内蔵された本体部41、補助メモリとしてのフロッピィディスクが挿入されドライブされるドライブ部42、オペレータがこのコンピュータシステム40に必要な指示等を入力するためのキーボード43および必要な情報を表示するためのＣＲＴディスプレイ44から構成されており、このコンピュータシステム40のメモリには患者の胸厚の情報に対応するラチチュードを胸厚の情報毎に多数記憶した標準テーブル２が記憶されている。また、メモリカード51は患者自別（被写体名別）に用意されており、患者の胸厚に関する情報が記録されている。

【００３８】次にコンピュータシステム40のキーボード43を操作することによりメモリカード51に記録された患者の胸厚の情報すなわち胸厚のサイズが読み取られる。コンピュータシステム40はこの胸厚の情報に基づいて、メモリに記憶された標準テーブル２を参照して、読取手段100でＸ線画像を読み取る際の読取条件におけるラチチュードが求められ、このラチチュードと予め定められた感度とに従ってたとえばフォトマルチプライヤ23に印加する電圧値や対数増幅器26の増幅率等が制御される。ここで、患者の胸厚は、一連の経過観察を行っている期間において、それほど変化するものではないため、このラチチュードは、この患者における一連の経過観察におけるＸ線画像を読取る際のラチチュードと同一のものとなる。

【００３９】以上のようにして読取条件が定められると、図示しないＸ線線影装置において患者のＸ線画像が蓄積記録された蓄積性蛍光体シート11の読取りが行われる。

【００４０】Ｘ線画像が記録された蓄積性蛍光体シート11は、読取手段100 の所定位置にセットされる。この所定位置にセットされた蓄積性蛍光体シート11は、図示しない

発光光21が発散され、この輝尽発光光21は光ガイド22によって導かれ、フォトマルチプライヤ（光電子増倍管）23によって光電的に検出される。上記光ガイド22はアクリル板等の導光性材料を成形して作られたものであり、直線状をなす入射端面22a が蓄積性蛍光体シート11上の主走査線に沿って延びるように配され、円環状に形成された射出端面22b に上記フォトマルチプライヤ23の受光面が結合されている。上記入射端面22a から光ガイド22内に入射した輝尽発光光21は、該光ガイド22の内部を全反射を繰り返して進み、射出端面22b から射出してフォトマルチプライヤ23に受光され、放射線画像を表わす輝尽発光光23の光量がフォトマルチプライヤ23によって電気信号に変換される。

【００４１】フォトマルチプライヤ23から出力されたアナログ出力信号Ｓは対数増幅器26で対数的に増幅され、Ａ／Ｄ変換器27でディジタル化され、画像信号Ｓ$_0$が得られる。この画像信号Ｓ$_0$の信号レベルは、蓄積性蛍光体シート11の各画素から発せられた輝尽発光光の光量の対数と比例している。以上のようにしてコンピュータシステム40で定められた読取条件により画像信号Ｓ$_0$が得られる。

【００４２】Ａ／Ｄ変換器27でディジタル化されることにより得られた画像信号Ｓ$_0$は、再度コンピュータシステム40に入力される。コンピュータシステム40内では患者の胸厚の情報に基づいて標準テーブル２を参照して得られたラチチュードに基づいてこの患者における過去の一連の経過観察用画像を得た際と同一の画像処理条件が定められて画像信号Ｓ$_0$に適切な画像処理が施され、この画像処理の施された画像信号は再生手段29に送られ、再生手段29においてこの画像信号に基づくＸ線画像が再生表示される。

【００４３】上記第１実施例において、条件を決定する際の感度は予め定められた値を用いるようにしたが、感度を入力する手段を設けて、外部から所定の値を入力するようにしてもよい。例えば、図示しない放射線画像の撮影手段と連動して、撮影手段が照射した放射線量により感度を設定してコンピュータシステム40に入力するようにしてもよく、またマニュアル操作により入力するようにしてもよい。

【００４４】次に、本発明の第２実施例について説明す

例と同様にＣＰＵおよび内部メモリが内蔵された本体部41，補助メモリとしてのフロッピディスクが挿入されドライブされるドライブ部42，オペレータがこのコンピュータシステム40に必要な指示等を入力するためのキーボード43および必要な情報を表示するためのＣＲＴディスプレイ44から構成されており，このコンピュータシステム40のメモリには患者の胸厚の情報に対応するラチチュードを胸厚の情報毎に多数記憶した標準テーブル２が記憶されている。また，メモリカード51は患者別（被写体名別）に用意されており，患者の胸厚に関する情報が記録されている。

【００４７】次にコンピュータシステム40のキーボード43を操作することによりメモリカード51に記録された患者の胸厚の情報すなわち胸厚のサイズが読み取られる。コンピュータシステム40はこの胸厚の情報に基づいて，メモリに記憶された標準テーブル２を参照して，本発明の第１実施例と同様にＸ線画像を読み取る際の読取条件のうちのラチチュードが求められる。

【００４８】Ｘ線画像が記録された蓄積性蛍光体シート11は，まず弱い光ビームで走査してこのシート11に蓄積された放射線エネルギーの一部のみを放出させて先読みを行なう先読手段100 の所定位置にセットされる。この先読手段100 および後述する本読手段100 ′の構成については上述した本発明の第１実施例と同様であるので詳しい説明は省略する。

【００４９】所定位置にセットされた蓄積性蛍光体シート11は，本発明の第１実施例と同様の方法で読み取られて電気信号に変換され，対数増幅器26で対数的に増幅され，Ａ／Ｄ片換器27でディジタル化され，先読画素信号Ｓｐが得られる。

【００５０】得られた先読画像信号Ｓｐはコンピュータシステム40に入力される。コンピュータシステム40では先読画像信号Ｓｐに基づいて読取条件及び／又は画像処理条件における感度が決定される。この読取条件および画像処理条件における感度を求める演算は公知のヒストグラムを用いる方法（例えば特開昭60−156055 号，同60−185944 号，同61−280163 号，同63−233658 号公報参照）を用いることができる。

【００５１】以上のようにして本読みの際の読取条件，すなわち感度およびラチチュードが求められ，この感

要素と対応する構成要素には先読手段100 で用いた番号にダッシュを付して示し，説明は省略する。

【００５３】Ａ／Ｄ変換器27′でディジタル化されることにより得られた画像信号Ｓｏは，再度コンピュータシステム40に入力される。コンピュータシステム40内では前述のようにして得られたラチチュードおよび感度に基づいてこの患者における過去の一連の経過観察用画像を得た際と同一の画像処理条件が定められており，画像信号Ｓｏに適切な画像処理が施され，この画像処理の施された画像信号は再生手段29に送られ，再生手段29においてこの画像信号に基づくＸ線画像が再生表示される。

【００５４】上記第１および第２実施例においては患者毎にその患者に関する情報を記録しておくメモリカード51を用意し，一連の経過観察の期間においてもそれほど変化のない胸厚の情報に基づいて，標準テーブル２を参照して読取条件及び／又は画像処理条件におけるラチチュードを決定し，一連の経過観察と同一の読取条件で読取り，かつ同一の画像処理条件で画像処理を施すようにした。このため過去の一連の経過観察用画像と比較観察するに適した再生画像を得ることができ，患者の病変部の進行や治療状態等を把握することができる。

【００５５】なお，上記第１および第２実施例においては患者の胸厚の情報に基づいて読取条件及び／又は画像処理条件におけるラチチュードを決定するようにしているが，患者の身長，体重，年令，性別および胸厚の情報のうちの少なくとも２つの情報に基づいてラチチュードを決定するようにしてもよい。本発明において，条件決定の際に必要であるのは患者の体格の情報であるので，この場合，少なくとも２つの情報のうち身長と体重を含んでいることが好ましい。

【００５６】また，上記第１および第２実施例においては，患者毎にメモリカード51を用意し，カード記録読取装置50により患者の胸厚の情報を読み取るようにしているが，メモリカード51およびカード記録読取装置50を用いなくともコンピュータシステム40のキーボード43から患者の胸厚の情報を入力するようにしてもよいことはもちろんである。

【００５７】さらに，上記実施例においては蓄積性蛍光体シートに記録された放射線画像を読み取る装置について説明しているが，本発明は，このような装置のほか，

は常に同一の読取条件及び／又は画像処理条件におけるラチチュードを決定するようにしたため、経過観察に適した放射線画像が得られ、患者の病変部の進行や治療状態を把握することができる。

【００５９】また、患者の個人情報を管理しなくてもよく、大容量の記憶装置を用いる必要がないため簡易なシステムにより読取条件及び／又は画像処理条件を決定することができる。

【図面の簡単な説明】

【図１】本発明の基本的概念を示すブロック図

【図２】本発明の第１実施例による条件決定方法を用いたシステムの全体概略図

【図３】本発明の第２実施例による条件決定方法を用いたシステムの全体概略図

【図４】再生表示された人体の放射線画像を示した図

【図５】図４に示す被写体について経時的に複数枚の放＊

＊射線画像を撮影．再生記録したときの画像の一部分の濃度を示したグラフ

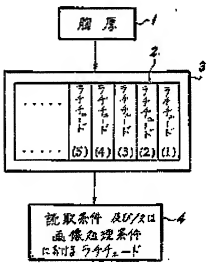
【図６】再生表示された人体の放射線画像を示した図

【図７】図６に示す被写体について経時的に複数枚の放射線画像を撮影．再生記録したときの画像の一部分の濃度を示したグラフ

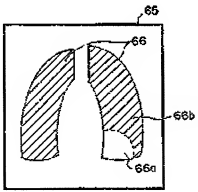
【符号の説明】

11、11′　蓄積性蛍光体シート
21、21′　輝尽発光光
23、23′　フォトマルチプライヤ
26、26′　対数増幅器
27、27′　Ａ／Ｄ変換器
40　コンピュータシステム
50　カード記録読取装置
51　メモリカード
100、100′　読取手段

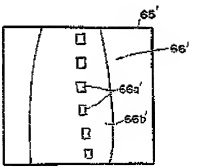
【図１】



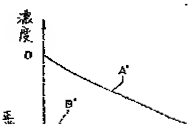
【図４】



【図６】

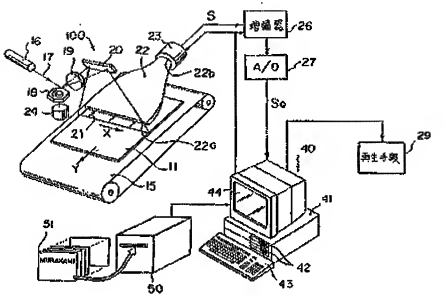


【図７】

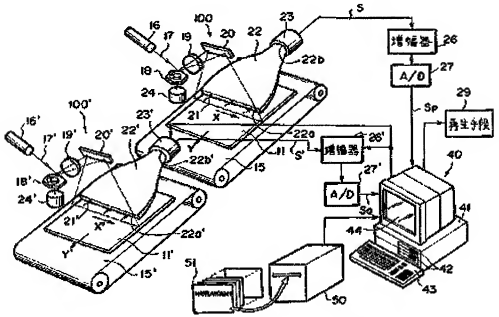


【図５】

【図２】


S
増幅器
26
A/D
27
Sd
29
再生手段
40
41
42
43
44
50
51
16
17
19
100
20
22
23
22b
18
24
21
X
Y
22c
11
15

【図３】


S
増幅器
26
A/D
27
Sp
29
再生手段
40
41
42
43
44
50
51
16
17
19
100
20
22
23
22b
18
24
21
X
Y
22c
11
15
16'
17'
19'
100'
20'
22'
23'
22b'
18'
24'
21'
X'
Y'
22c'
11'
15'
S'
26'
27'
Sd'